A systematic overview of the effectiveness of physical therapy intervention on soft tissue neck injury following trauma
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Authors' objectives
To assess the evidence concerning the effectiveness of physical therapy intervention for soft tissue neck injuries, following trauma induced by automobile accidents.

Searching
The following databases were searched: MEDLINE from 1985 to February 1997; CINAHL from 1985 to December 1996; EMBASE from 1988 to December 1996; Current Contents from 1966 to March 1997; HealthSTAR from 1985 to December 1996; Canadian Research Index from 1982 to 1997; AMED from 1985 to 1997; CHIROLARS from 1990 to 1997; the Agency for Health Care Policy and Research (AHCPR); and the Cochrane Library from 1985 to 1997. The keywords used were 'physical therapy', 'intervention', 'whiplash', 'cervical strain', 'neck', 'pain' and 'treatment'. The authors also reviewed the reference lists of the identified articles.

Four key journals were handsearched back one year. These included Spine, Journal of Orthopedic and Sports Physical Therapy, Manual Therapy, and Journal of Manipulative Therapeutics. Relevant references (going back to 1980) from each paper were also reviewed.

Study selection
Study designs of evaluations included in the review
Prospective controlled studies and before-and-after studies. Five of the eight studies included in the review were randomised controlled trials and three were uncontrolled trials.

Specific interventions included in the review
Physical therapy interventions or programmes that were within the scope of physical therapy practice in Canada.

The physical therapy interventions covered by the included studies were varied. The therapies were hospital- or clinic-based or home programmes. The time between the accident and the intervention varied from 24 hours to over 5 years. In the majority of the studies, it was not specifically stated whether a physical therapist or another individual provided the intervention.

The controlled studies all involved different interventions: mobilisation; home exercise or physiotherapy; electromagnetic therapy collar; multi-modal; or soft collar. The uncontrolled studies investigated the effects of acupuncture, transcutaneous electrical neurostimulation, and spinal manipulative therapy.

Participants included in the review
Both male and female participants with sufficient soft tissue trauma to the cervical spine had to be included. Patients with chronic conditions (e.g. rheumatoid arthritis), more severe injuries indicated by a neurological deficit or with acute severe injuries (e.g. fractures) were excluded because these factors might have confounded the treatment. The authors were primarily concerned with soft tissue trauma to muscles, ligaments and connective tissue.

Outcomes assessed in the review
At least one of the following three outcomes had to be measured: range of motion, pain, and/or patient satisfaction or outcome.

The range of motion was usually assessed using a goniometer, but the final range of motion values were measured or compiled differently in each study. For example, range of motion was noted as individual measurements (e.g. flexion, extension, side flexion or rotation); the sum of all of the movements; normative values converted to ordinal scores; or using one movement as a criterion for limitation of the other movements.
Pain was measured using a visual analogue scale in all of the studies.

For patient satisfaction or outcome, a visual analogue scale was the most common measurement tool used.

**How were decisions on the relevance of primary studies made?**
All titles obtained from the computer searches and their reference lists were assessed by two independent assessors. The authors stated that the level of agreement between the two assessors was high. Where discrepancies existed, the two reviewers met to discuss the differences and reach a consensus. It is not stated whether the reviewers were blinded to the results or source.

**Assessment of study quality**
A tool, modified from one developed and pre-tested for use in other reviews, was used to assess validity. The validity criteria included the following: the method of allocating the study groups; the level of agreement to participate in the study; control of the confounders; the method of data collection (e.g. pre-testing of data collection tools, blinding of data collectors to participant group allocation); the percentage of participants allowed for follow-up; the type of study; description of the physical therapy intervention; the reliability and validity of the data collection methods. Two reviewers independently completed the validity ratings of all eight articles; there were no discrepancies in the ratings between the two reviewers. Both reviewers rated all the eight articles as ‘weak’. It was then decided by consensus to divide the original ‘weak’ papers into two categories, weak and poor, depending on the number of criteria the article was judged to have failed on. Under the new category headings, six articles were judged as ‘weak’ and two were judged as ‘poor’.

**Data extraction**
A data collection tool was used to extract information on the study design, participant population, physical therapy interventions, and the type of analysis.

The authors do not state how the data were extracted for the review, or how many of the reviewers performed the data extraction.

**Methods of synthesis**
**How were the studies combined?**
A qualitative, narrative synthesis was undertaken. Publication bias was not assessed.

**How were differences between studies investigated?**
The authors stated that the studies were too different to pool results in a meta-analysis, but no formal statistical test of heterogeneity was performed.

**Results of the review**
Of the 320 articles identified, 8 met all of the inclusion criteria and were included in the review.

Seven of the eight studies indicated a weak or strong improvement in the treatment group, while no study showed any harmful effects from physical therapy interventions. This indicates a modest trend for a positive effect following certain physical therapy interventions.

In the included studies, the therapies that indicated at least a positive trend in treating acute soft tissue neck injuries were exercise, manual therapy, pulsed electromagnetic therapy, and educational advice on posture and positioning. Chronic neck injuries responded positively to a holistic acupuncture approach. Only the use of soft collars for a 1- to 3-week period was not supported.

**Authors' conclusions**
Exercises, manual therapy, educational advice on posture and pulsed electromagnetic therapy, i.e. methods commonly
used by physical therapists, appear to have had a positive effect on acute traumatic neck injuries following automobile accidents. There was evidence indicating that acupuncture may be useful in the treatment of chronic whiplash injuries. The evidence also suggested that the use of soft cervical collars alone was of no value in treating acute soft tissue neck injuries, although the patients felt more comfortable when using them in the presence of neck pain.

CRD commentary
The authors stated their review question and the study inclusion criteria clearly. The literature search was clearly described and included a wide range of databases, supplemented by handsearches of four key journals. It was not stated whether any language restrictions were applied. No analyses were conducted to assess publication bias. Two independent reviewers assessed the studies for inclusion; the level of agreement between the two reviewers was high. It was not stated whether the reviewers were blinded to the results or source. The validity of the primary studies was systematically assessed by two reviewers; there were no discrepancies between their ratings. The included studies were categorised as 'weak' and 'poor', and their limitations were discussed.

Details of the primary studies were presented narratively. Where available, this included information on the study design, the sample size in each study group, participant characteristics, interventions, settings, outcome measures, and results. The narrative synthesis of the presented studies concentrated too heavily on the individual studies rather than drawing together their findings, making the synthesis too long.

Heterogeneity between the studies was not statistically evaluated, although the authors acknowledged that the studies were too different to enable the results to be pooled in a meta-analysis.

The authors’ conclusions are partly supported by the data presented in the review. The findings of the review are inconclusive given the varied studies and the synthesis presented.

Implications of the review for practice and research
Practice: The authors state that it is important to realise that, although there is evidence of support for the use of physical therapy in the treatment of soft tissue neck injury following trauma, the use of different combinations of possible interventions makes it very difficult to say conclusively which interventions or combinations of interventions are most effective.

Research: The authors state that more rigorous research designs are necessary. Specifically, randomised trials that limit treatment intervention to one or two well-described physical therapy intervention methods, and avoid the use of conterventions unless there are sufficient groups, should be used. Further testing of the reliability and validity of the measurement instruments, especially range of motion and patient outcomes, is also required. When conducting studies, the study population must be homogeneous with well-described inclusion and exclusion criteria. Finally, the validity of the research findings could also be improved by controlling for possible confounders in the data analysis.

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Record Status
This is a critical abstract of a systematic review that meets the criteria for inclusion on DARE. Each critical abstract contains a brief summary of the review methods, results and conclusions followed by a detailed critical assessment on the reliability of the review and the conclusions drawn.